RTE POWER/MATE

Operator Manual

Model LL 300 B

RTE POWER/MATE

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Specifications

ac input: 105 to 125 V ac, 47 to 63 Hz (other inputs optional)

Maximum loading power: 1250 W (see Operating Curve)

Maximum load voltage: 50 V dc

Minimum load voltage: 1.5 V dc

Static mode: Constant current or constant resistance

Dynamic mode: Allows switching between two current levels at a vernier selected rate from 1 Hz to 500 Hz; peak and minimum pulse currents are set by front panel controls

Dynamic load response time: 1 μs/A or 150 μs, whichever is greater

Remote programming, constant current: 0 to 4.2 V is equal to 0 to 250 A; program voltage input impedance approximately 5,000 Ω

Remote programming, constant resistance: External program resistor required; 10,000 Ω is equal to a load resistance of 1 Ω; resistance range is 0.01 to 100 Ω

Meter ranges: Voltmeter 0 to 49.99 V; ammeter 0 to 299.9 A (single digital meter function is switch selectable)

Meter accuracy: 1.0% full scale, ±1% least significant digit

Protection circuits: Electronic circuit limits power dissipation; load shuts down in the event of an overvoltage (crowbar); thermal breakers shut off load in the event of overheating

Current signal output: Voltage proportional to current is provided; 1 mV/A ±2%

Operating temperature range: 0° to 40° C

Dimensions: 5.38 in. x 10.31 in. x 17.56 in.

Weight: 30 lb

1.0 Introduction

Lectra-Load II is a solid-state programmable electronic load for testing virtually any power supply. Lectra-Load II dissipates up to 1200 W of continuous dc power with an input voltage range of 1.5 V to 50 V dc and provides static or dynamic testing in either constant current or constant resistance modes. It features a constant current capability of 0 to 300 A and three constant resistance ranges of 0 to 1, 0 to 10, and 0 to 100 A/V.

Lectra-Load II can be set for constant current, constant resistance or pulsed modes, either from the front panel or remotely. It has a full four-digit switchable display for voltage and current, true short-circuit test capability, forced air cooling, oscilloscope output for sampling, crowbar overvoltage protection, overcurrent protection, thermal protection and an LED overload indicator.

2.0 Safety

Always ensure that correct polarity is observed when operating Lectra-Load II. The power supply being tested must be connected securely to the input terminals of Lectra-Load II.

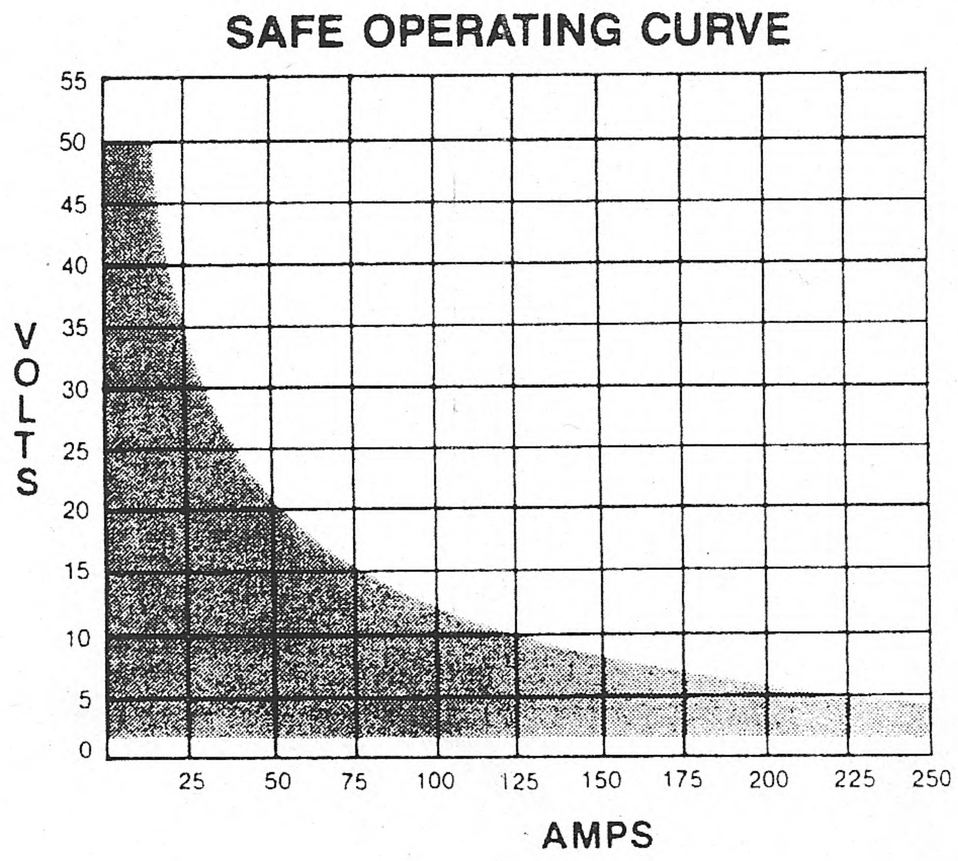
Turn Lectra-Load II power off before connecting or disconnecting power supplies or remote programming devices.

WARNING: The procedures described in these instructions are intended for use by persons knowledgeable of the characteristics of dc power and in the use of dc electronic test equipment. In some cases, high voltage and current levels are present in exposed power supplies. Persons unfamiliar with dc electronic test equipment and safe operating procedures with dc power should not operate this equipment.

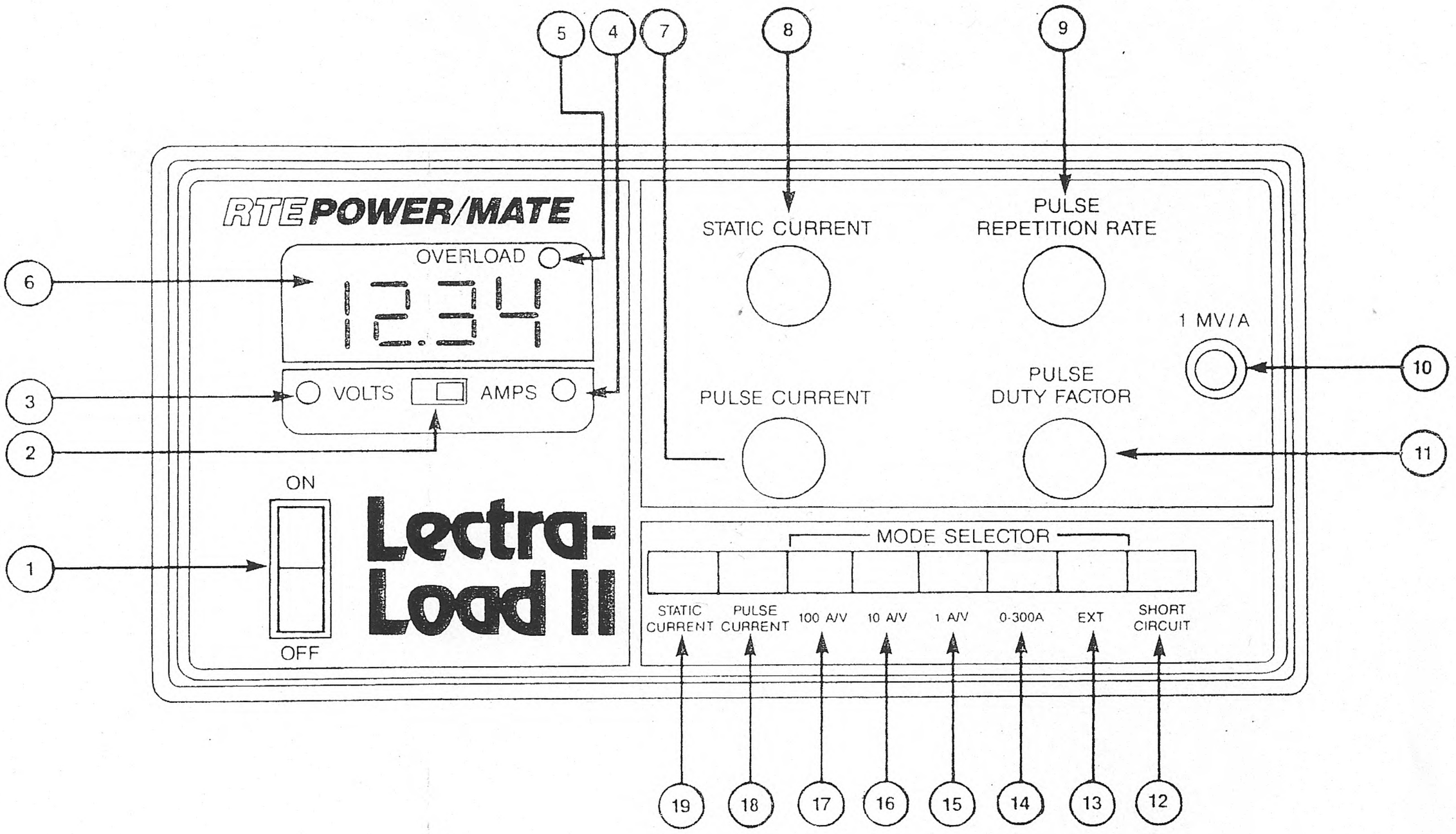
These instructions are not intended to replace normal safe operating practices. If there are any questions regarding the safe operation of this device, contact your RTE POWER/MATE representative.

2.1 Safe Operating Range

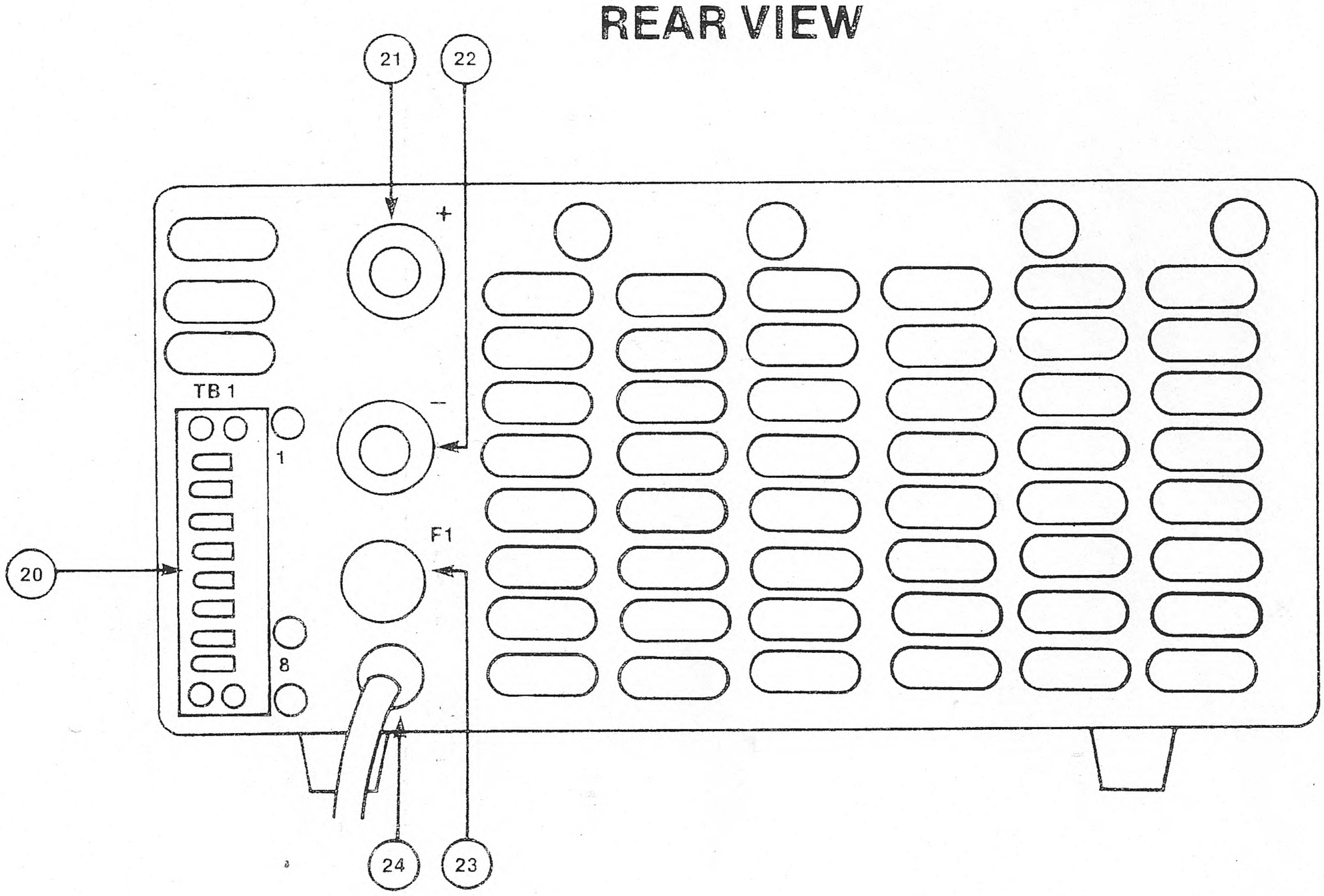
The safe operating range for Lectra-Load II is shown below. The illustration should be consulted whenever new test parameters are set for the Lectra-Load II.



FRONT VIEW



REAR VIEW



3.0 Functional Controls

Front Control Panel

CONTROL OR INDICATOR	FUNCTION
1. ac Line Switch	Turns unit ON or OFF.
2. Volt/Ampere Selector Switch	Sets meter to read either voltage or current.
3. Voltage LED Indicator	Lights when meter is set to read voltage.
4. Amperage LED Indicator	Lights when meter is set to read current.
5. Overload LED Indicator	Lights when overload condition exists.
6. Digital Display	Indicates voltage across input terminals in voltage mode; reads load current in current mode.
7. Pulse Current Control	Adjusts pulse current.
8. Static Current Control	Adjusts static current.
9. Pulse Repetition Rate Control	Adjusts pulse repetition rate.
10. BNC Connector	Connects oscilloscope to monitor load current at 1 mV/A.
11. Pulse Duty Factor Control	Increases pulse duty factor from 0 to 100%.
12. Short-Circuit Pushbutton	Activates internal relay to apply direct short to tested device.
13. External Selector Pushbutton	Places unit in external mode for programming through rear panel barrier strip.
14. 0 — 300 A Selector Pushbutton	Places unit in 0 — 300 A constant current mode.
15. 1 A/V Range Selector Pushbutton	Places unit in 1 A/V constant resistance mode.
16. 10 A/V Range Selector Pushbutton	Places unit in 10 A/V constant resistance mode.
17. 100 A/V Range Selector Pushbutton	Places unit in 100 A/V constant resistance mode.
18. Pulse Current Pushbutton	Sets unit for pulse current mode.
19. Static Current Pushbutton	Sets unit for load or no load condition.

Rear Panel

	FUNCTION
20. Rear Panel Barrier Strip (TB1)	Used for remote operation, external programming and monitoring.
21. Positive Input Terminal	Busbar connection for positive dc sources.
22. Negative Input Terminal	Busbar connection for negative dc sources.
23. Fuse (F1)	ac line fuse.
24. ac Line Cord	Connects unit to ac power source.

4.0 Constant Current Operation

4.1 Introduction

Lectra-Load II can be used as a constant current source to test power supplies intended for ECL logic levels (1.5 V dc and up), batteries, capacitor banks, and dc voltage regulators.

4.2 Equipment Required

None.

4.3 Procedure

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

4.3.1 Ensure that the Lectra-Load II ac Line Switch (1) is set to OFF.
a) No display is seen on the control panel.

4.3.2 Connect the power supply to be tested to the Positive (21) and Negative (22) Input Terminals of Lectra-Load II.

4.3.3 Press the 0 — 300 A Selector Pushbutton (14).
a) The pushbutton remains set (down).

4.3.4 Set the Volt/Ampere Selector Switch (2) to the VOLTS (left) position.

4.3.5 Turn the Static Current Control (8) approximately ten turns counterclockwise.

4.3.6 Set the ac Line Switch to the ON position.
a) The Digital Display (6) lights, indicating a voltage level.
b) The Voltage LED Indicator (3) lights.
c) The ac Line Switch lights.

4.3.7 Press the Static Current Pushbutton (19).
a) The pushbutton remains set (down).

4.3.8 Set the Volt/Ampere Selector Switch to the AMPS (right) position.

4.3.9 Turn the Static Current Control (8) to the level desired on the Digital Display.

4.3.10 Set the Volt/Ampere Selector Switch to the VOLTS position.
a) The Digital Display indicates the output voltage of the power supply being tested.

5.0 Constant Resistance Operation

5.1 Introduction

The constant resistance mode enables Lectra-Load II to test power supplies equipped with foldback current-limiting (crowbar) circuits and provides constant resistance for power supply startup. Once the power supply has reached full voltage, Lectra-Load II can be switched to any other mode of operation.

5.2 Equipment Required

None.

5.3 Procedure

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

5.3.1 Ensure that the ac Line Switch (1) is set to OFF.
a) No display is seen on the control panel.

5.3.2 Connect the power supply to be tested to Positive (21) and Negative (22) Input Terminals of Lectra-Load II.

5.3.3 Press an Ampere/Volt Range Selector Pushbutton, selecting the range desired for 1 A/V (15), 10 A/V (16), or 100 A/V (17).
a) The pushbutton remains set (down).

5.3.4 Set the Volt/Ampere Selector Switch (2) to the VOLTS (left) position.

5.3.5 Turn the Static Current Control (8) approximately ten turns counterclockwise.

5.3.6 Set the ac Line Switch (1) to the ON position.
a) The Digital Display (6) lights, showing a voltage level.
b) The Voltage LED Indicator (3) lights.
c) The ac Line Switch lights.

5.3.7 Press the Static Current Pushbutton (19).
a) The pushbutton remains set (down).

5.3.8 Set the Volt/Ampere Selector Switch to the AMPS (right) position.
a) The Amperage LED Indicator (4) lights.

5.3.9 Turn the Static Current Control (8) to the desired current level as shown on the Digital Display.

5.3.10 Set the Volt/Ampere Selector Switch to the VOLTS (left) position.
a) The Digital Display shows the voltage output of the power supply being tested.

6.0 Pulse Operation

6.1 Introduction

The load capacity of Lectra-Load II is continuously variable, from 0 A to 300 A. Lectra-Load II has an adjustable duty factor of 0% to 100% at a repetition rate from 2 ms to 1 s. The pulse load is in addition to but independent of the static load.

6.2 Equipment Required

Oscilloscope (optional) with 10X clip probe.

6.3 Pulse Test Procedure without Oscilloscope

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

6.3.1 Ensure that the Lectra-Load II ac Line Switch (1) is set to OFF.
a) No display is seen on the control panel.

6.3.2 Connect the power supply to be tested to the Positive (21) and Negative (22) Input Terminals of Lectra-Load II.

6.3.3 Press an Ampere/Volt Range Selector Pushbutton, selecting the range desired for 1 A/V (15), 10 A/V (16), or 100 A/V (17).
a) The pushbutton remains set (down).

6.3.4 Set the Volt/Ampere Selector Switch (2) to the AMPS (right) position.

6.3.5 Set the ac Line Switch to the ON (up) position.
a) The Amperage LED Indicator (4) lights.
b) The Digital Display (6) lights, showing some amperage value.

6.3.6 Press the Static Current Pushbutton (19).

6.3.7 Turn the Static Current Control (8) to the desired current level indicated on the Digital Display.

6.3.8 Turn the Pulse Duty Factor Control (11) fully counterclockwise.

6.3.9 Press the Pulse Current pushbutton (18).
a) The pushbutton stays set (down).

6.3.10 Turn the Pulse Current Control (7) to the desired level indicated on the Digital Display.

6.3.11 Turn the Pulse Duty Factor Control to the desired level indicated on the Digital Display.

6.3.11.1 The Pulse Duty Factor that should be displayed is calculated as follows:

$$I_m = I_s + \frac{T_{on}}{T} (I_p)$$

Where:
I_m = Display reading
I_s = Static current
I_p = Pulse current
T_{on} = Pulse duration (duty factor)
T = Time between pulses (repetition rate)

Note: Actual time for T_{on} or T is not required. Only the desired duty factor (T_{on}/T) is required to determine the meter reading for a pulse current Ip and a static load current I_s.

6.3.12 Set the Volt/Ampere Selector Switch to VOLTS (left).
a) The Digital Display indicates the output voltage of the power supply being tested.

6.4 Pulse Test Procedure with Oscilloscope

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

6.4.1 Connect the oscilloscope Channel 1 lead to the BNC connector (10).

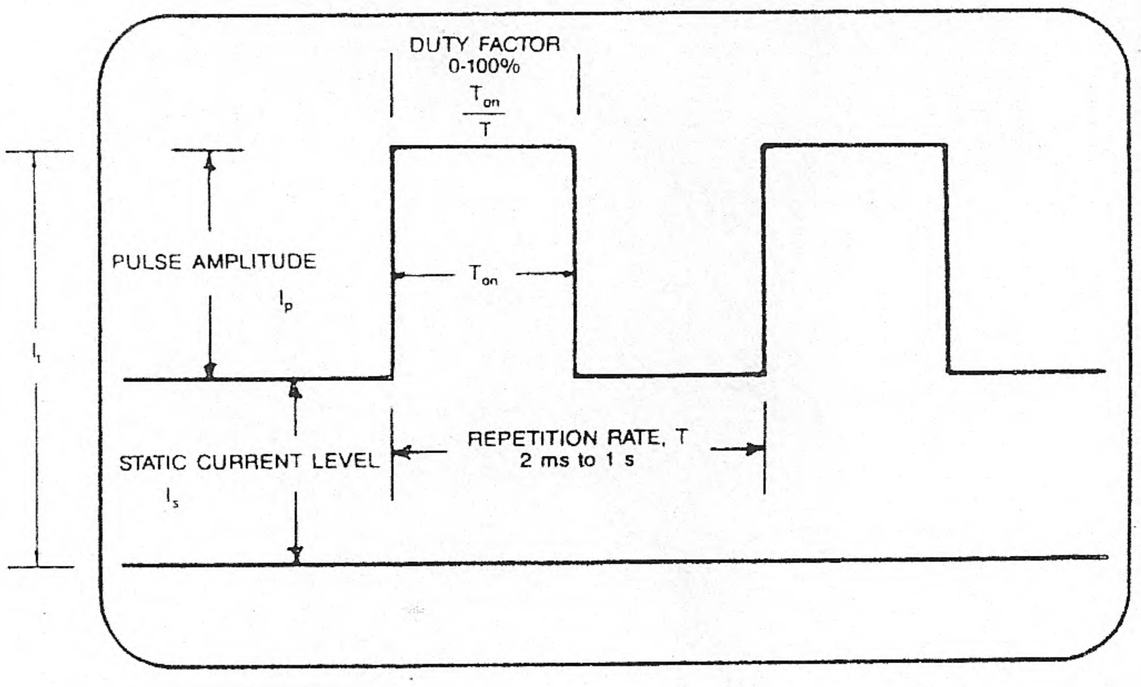
6.4.2 Proceed with Steps 6.3.1 through 6.3.12.

6.4.3 Read the Pulse Duty Factor and Repetition Rates on the oscilloscope (see Figure 1 below).

6.4.4 The Repetition Rate may be changed by turning the Pulse Repetition Rate Control (9).

6.4.5 Set the Volt/Ampere Selector Switch to VOLTS (left).
a) The Digital Display indicates the output voltage of the power supply being tested.

Figure 1
Wave Form



7.0 Multiple Load Operation

7.1 Introduction

Lectra-Load II can test power supplies at three different load levels (no load, and two preset load levels).

7.2 Equipment Required

None.

7.3 Set-up Procedure

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

7.3.1 Set the ac Line Switch (1) to ON.
a) The ac Line Switch lights.

7.3.2 Set the Volt/Ampere Selector Switch (2) to AMPS (right).
a) The Amperage LED Indicator (4) lights.

7.3.3 Turn the Pulse Duty Factor Control (11) fully counterclockwise.

7.3.4 Press the 0 — 300 A Selector Pushbutton (14).
a) The pushbutton stays set (down).

7.3.5 Press the Static Current Pushbutton (19).
a) The pushbutton stays set (down).

7.3.6 Turn Static Current Control (8) to the desired level.

7.3.7 Press the Pulse Current Pushbutton (18).
a) The pushbutton stays set (down).

7.3.8 Turn the Pulse Current Control (7) to the desired level.

7.4 Operation

7.4.1 When both the Pulse Current and Static Current Pushbuttons are released, no load is seen by the power supply.

7.4.2 Press the Static Current Pushbutton.
a) The pushbutton stays set (down).
b) The power supply sees the static current load.

7.4.3 Press the Pulse Current Pushbutton.
a) The pushbutton stays set (down).
b) The power supply sees the pulse current load.

8.0 Remote Control Operation

8.1 Introduction

Lectra-Load II can be controlled remotely in either constant current or constant resistance modes. Constant current control requires the use of an external voltage source. Constant resistance control requires the use of an external variable resistor. In both cases, the external mode is selected by pressing the External Selector Pushbutton (13) and the Static Current Pushbutton (19).

8.2 Constant Current Remote Control

8.2.1 Equipment Required

- 0 — 5 V power supply
- Jumper wire

8.2.2 Procedure

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

8.2.2.1 Ensure that the ac Line Switch (1) is set to OFF (down).

8.2.2.2 Connect a jumper wire between pins 3 and 4 on TB1 (20).

8.2.2.3 Connect the positive output of the power supply to pin 2 of TB1.

8.2.2.4 Connect the negative output of the power supply to pin 8 of TB1.

8.2.2.5 Lectra-Load II can now be controlled remotely by changing the output voltage of the power supply.

8.3 Constant Resistance Remote Control

8.3.1 Equipment Required

- 85 Ω — 1 MΩ fixed or variable resistor
- 100 — 1000 mF polarized capacitor
- Jumper wire

8.3.2 Procedure

8.3.2.1 Ensure that the ac Line Switch (1) is set to OFF (down).

8.3.2.2 Connect a jumper wire between pins 4 and 6 on TB1 (20).

8.3.2.3 Connect the negative capacitor lead to pin 8 on TB1.

8.3.2.4 Connect the positive capacitor lead to pin 4 of TB1.

8.3.2.5 Connect a fixed resistor to pin 1 and pin 4 of TB1.

8.3.2.5.1 To select values of resistance for loads of greater than 20 mΩ:

$$R_p = 9.9 \left(\frac{990\ V_{in}}{I} - 1 \right)$$

8.3.2.5.2 For correct values of resistance for loads of less than 20 mΩ:

$$R_p = 9.9 \left(990 \left[\frac{V_{in}}{I} - 2.8 \times 10^{-4} \right] - 1 \right)$$

Where:
R_p = Programming resistance
V_{in} = Displayed voltage*
I = Load current†

* Either the value shown on Digital Display or the value shown from pin 1 (+S) and pin 8 (−S) on TB1 measured at the required load current.

† Either the value shown on the Digital Display or the values shown from pin 7 and 8 on TB1 (signal level 1 mV/A).

8.3.2.6 If desired, a variable resistor of 85 Ω — 1 MΩ can be substituted for a fixed resistor. The resistance of Lectra-Load II can then be controlled remotely by adjusting the variable resistor.

9.0 Short-Circuit Testing

9.1 Introduction

Lectra-Load II has a true short-circuit capability and displays a direct readout of short-circuit current. The input resistance of the Lectra-Load II during a short circuit is approximately 2.65 mΩ. We recommend at least 500 circular mils/A cable resistance for connections. High resistance in cables will yield poor results during short-circuit tests.

Caution: Short-circuit testing is not recommended for power supplies over 24 V dc because testing them will materially shorten the life of Lectra-Load II relay contacts.

9.2 Equipment Required

None.

9.3 Procedure

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

9.3.1 Ensure that the ac Line Switch (1) is set to OFF (down).

9.3.2 Connect the power supply to be tested to the Positive (20) and Negative (21) Input Terminals of the Lectra-Load II.

9.3.3 Set the Volt/Ampere Selector Switch (2) to the AMPS (right) position.

9.3.4 Set the ac Line Switch to ON (up).
a) The Amperage LED Indicator (4) lights.
b) The Digital Display (6) shows some value.

9.3.5 Press the Short-Circuit Pushbutton (12).
a) The pushbutton does not stay set.
b) The Digital Display shows the short-circuit current output of the power supply being tested.

9.3.6 Release the Short-Circuit Pushbutton.
a) The pushbutton releases.
b) The Digital Display shows some low value.

9.3.7 Set the Volt/Ampere Selector Switch to the VOLTS (left) position.
a) The Voltage LED indicator (3) lights.

9.3.8 Press the Short-Circuit Pushbutton.
a) The pushbutton does not stay set.
b) The Digital Display shows the short-circuit voltage level output of the power supply being tested.

10.0 Calibration

CAUTION: CALIBRATION SHOULD BE PERFORMED ONLY BY QUALIFIED TECHNICIAN.

Warning: Do not place tools or personal objects (neckties, jewelry, fingers, etc.) anywhere inside Lectra-Load II during calibration other than where directed. Avoid contact with any source of alternating current, such as transformer primary connections, ac line switch, and ac power cord connections.

10.1 Meter Nulling

10.1.1 Equipment Required

None.

10.1.2 Nulling Procedure

10.1.2.1 Remove Lectra-Load II from its power source.

10.1.2.2 Press the Static Current Pushbutton (19).
a) The pushbutton remains set (down)

10.1.2.3 Press the 1 A/V Range Selector Pushbutton (15).
a) The pushbutton remains set (down).

10.1.2.4 Turn the Static Current Control (8) fully counterclockwise until resistance is felt.

10.1.2.5 Turn the Pulse Current Control (7) fully counterclockwise until resistance is felt.

10.1.2.6 Turn the Pulse Repetition Rate Control (9) fully counterclockwise.

10.1.2.7 Turn the Pulse Duty Factor Control (11) fully counterclockwise.

10.1.2.8 Set the Volt/Ampere Selector Switch (2) to the AMPS (right) position.

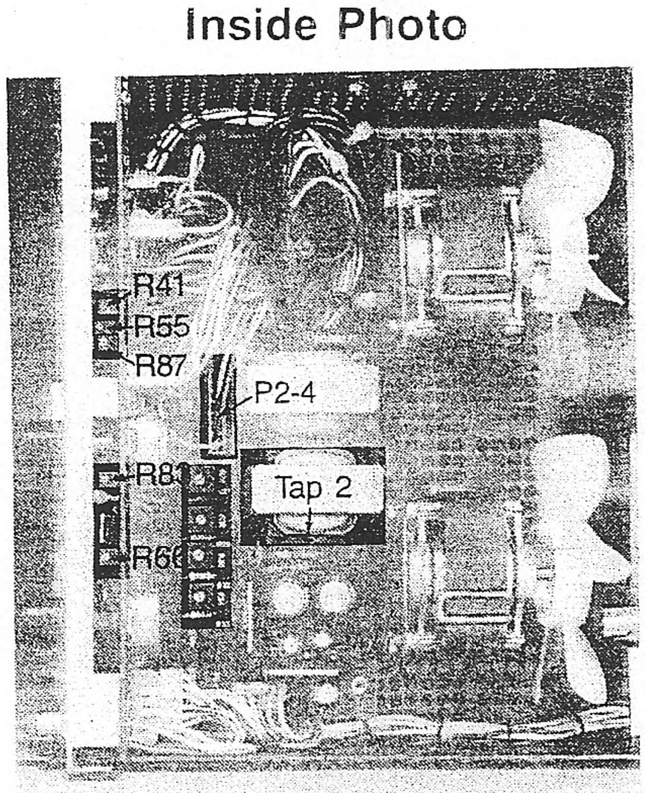
10.1.2.9 Remove the top cover of Lectra-Load II.

10.1.2.10 Connect Lectra-Load II to power source.

10.1.2.11 Set the ac Line Switch (1) to ON (up).
a) The ac Line Switch lights.
b) The Amperage LED Indicator (4) lights.
c) The Digital Display (6) indicates zero (0) amperes.

10.1.2.12 Adjust potentiometer R87 (see Figure 2) until the Digital Display indicates zero (0) amperes.

Figure 2
Inside Photo



10.2 Voltmeter Calibration

10.2.1 Equipment Required

- 0 — 60 V dc @ 1 A power supply
- Digital dc voltmeter, 0 — 100 V range

10.2.2 Set-up

10.2.2.1 Remove Lectra-Load II from power source.

10.2.2.2 Remove top cover of Lectra-Load II.

10.2.2.3 Connect dc power supply to the Positive (21) and Negative (22) Input Terminals of Lectra-Load II, observing polarity.

10.2.2.4 Connect digital voltmeter (DVM) to the Positive and Negative Input Terminals of Lectra-Load II, observing polarity (see Figure 3).

10.2.2.5 Set Volt/Ampere Selector Switch (2) to VOLTS (left) position.

10.2.2.6 Ensure that all front panel selector switches are released (out).

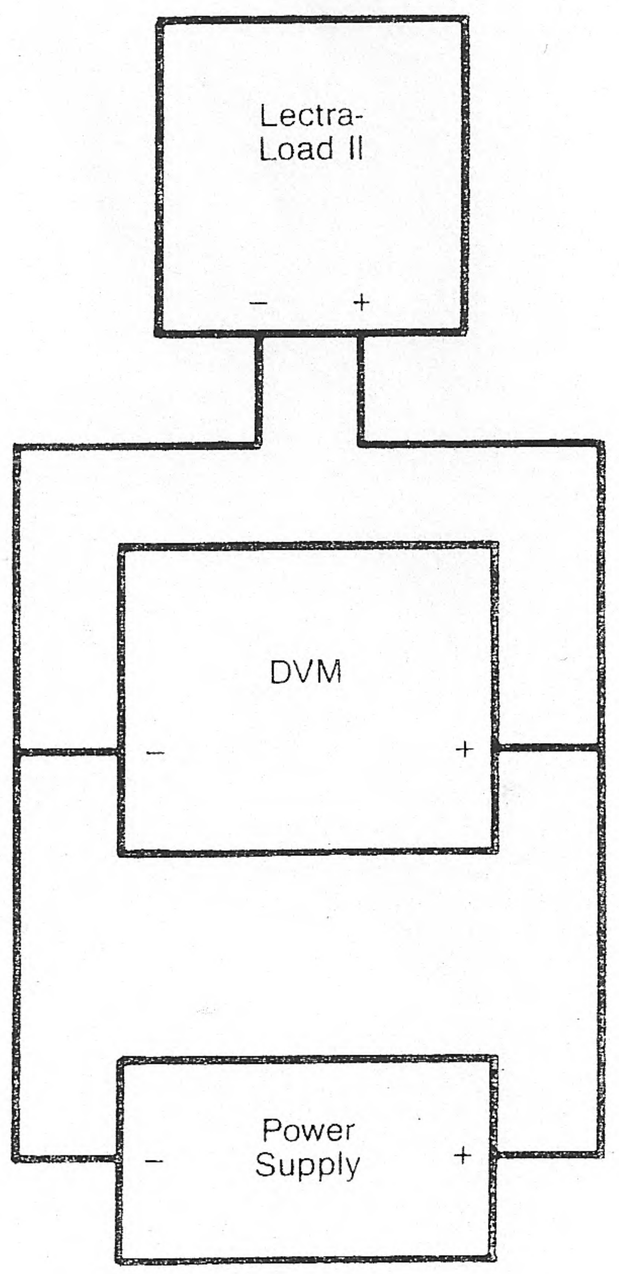
10.2.3 Voltage Calibration Procedure

10.2.3.1 Connect Lectra-Load II to power source.

10.2.3.2 Set the ac Line Switch (1) to ON (up).
a) The Digital Display (6) indicates some low value.
b) The Voltage LED Indicator (3) lights.

10.2.3.3 Turn on dc power supply.

Figure 3
Voltage



10.2.3.4 Set dc power supply to 50 V dc.
a) The Lectra-Load II Digital Display value increases.

10.2.3.5 Adjust potentiometer R55 (Figure 2) until Digital Display indicates 50 V dc.

10.3 Current Calibration

10.3.1 Equipment Required

- 5 V dc @ 120 A power supply
- Two digital dc voltmeters, 0 — 200 V range
- Double-ended BNC 10X oscilloscope cable assembly
- Calibrated shunt, 100 A/200 mV

10.3.2 Set-up

Note: Numbers in parentheses refer to item numbers found in Section 3.0.

10.3.2.1 Disconnect Lectra-Load II from power source.

10.3.2.2 Remove Lectra-Load II top cover.

10.3.2.3 Connect the negative lead of a DVM to the center tap of transformer T1 (see Figure 4).

10.3.2.4 Connect the positive DVM lead to pin 2 of Plug P4 (see Figure 4).

10.3.2.5 Press the 100 A/V Pushbutton (17).
a) The pushbutton stays set (down).

10.3.2.6 Press the Static Current Pushbutton (19).
a) The pushbutton stays set (down).

10.3.2.7 Connect Lectra-Load II to power source.

10.3.2.8 Set the ac Line Switch (1) to ON (up).
a) The ac Line Switch lights.
b) The DVM indicates 500 mV.

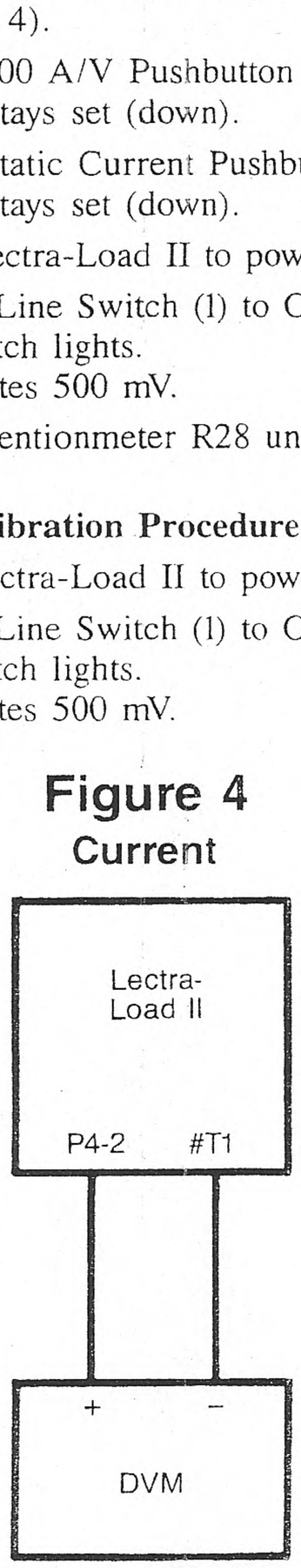
10.3.2.8.1 Adust potentionmeter R28 until the DVM indicates 500 mV.

10.3.3 Current Calibration Procedure

10.3.3.1 Connect Lectra-Load II to power source.

10.3.3.2 Set the ac Line Switch (1) to ON (up).
a) The ac Line Switch lights.
b) The DVM indicates 500 mV.

Figure 4
Current



10.3.3.2.1 Adust potentionmeter R28 until the DVM indicates 500 mV.

10.3.3.3 Set the ac Line Switch to OFF (down).

10.3.3.4 Disconnect Lectra-Load II from power source.

10.3.3.5 Connect 5 V dc power supply to the Lectra-Load II Negative Input Terminal (21).

10.3.3.6 Connect the positive terminal of the power supply to one side of the shunt.

10.3.3.7 Connect the other side of the calibrated shunt to the positive terminal of Lectra-Load II.

10.3.3.8 Connect a DVM set at the 200 mV range across the shunt, observing polarity.

10.3.3.9 Connect the other digital voltmeter set at 200 mV range to the BNC Connector (10). (See Figure 5.)

10.3.3.10 Connect Lectra-Load II to power source.

10.3.3.11 Connect 5 V dc power supply to power source.

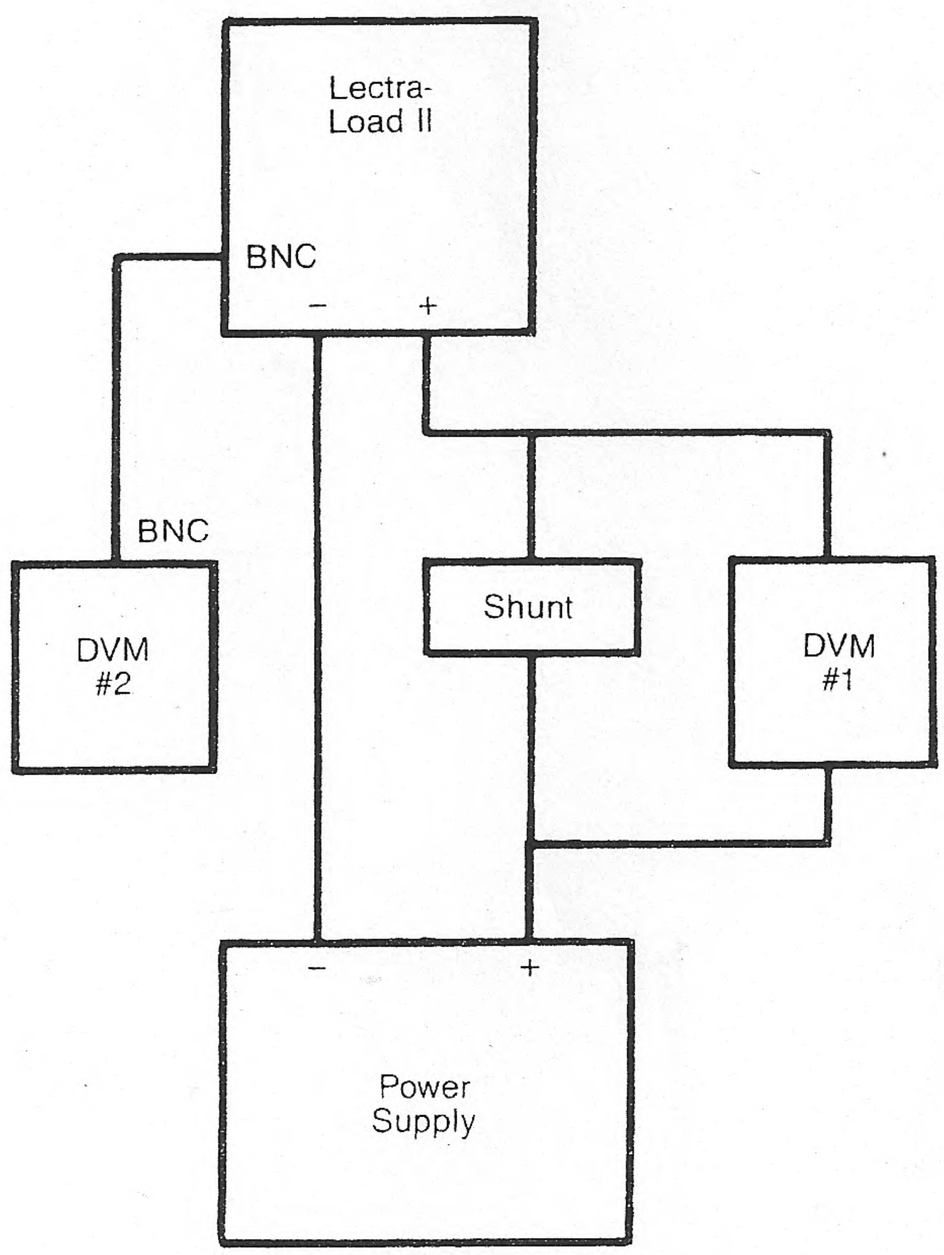
10.3.3.12 Set the ac Line Switch to ON (up).
a) The ac Line Switch lights.

10.3.3.13 Press the Static Current pushbutton (19).
a) The pushbutton remains set.

10.3.3.14 Press the 0 — 300 A Selector Pushbutton (14).
a) The pushbutton remains set.

10.3.3.15 If the DVM across the shunt indicates less than 100 mA, turn the Static Current Control (8) until it indicates 100 mA.

Figure 5
Current



10.3.3.16 Adjust potentiometer R83 (Figure 2) until both DVM indications are identical.

10.3.4 Ammeter Calibration

10.3.4.1 EQUIPMENT REQUIRED

- 5 V dc @ 120 A power supply
- Calibrated shunt, 100 A/100 mV
- Digital dc voltmeter, 0 — 200 mV range

10.3.4.2 SET-UP

10.3.4.2.1 Disconnect Lectra-Load II from power source.

10.3.4.2.2 Remove Lectra-Load II top cover.

10.3.4.2.3 Connect one side of the calibrated shunt to the Positive Input Terminal (21) of Lectra-Load.

10.3.4.2.4 Connect one side of the shunt to the positive side of the power supply.

10.3.4.2.5 Connect the negative side of the power supply to the Negative Input Terminal (22) of Lectra-Load.

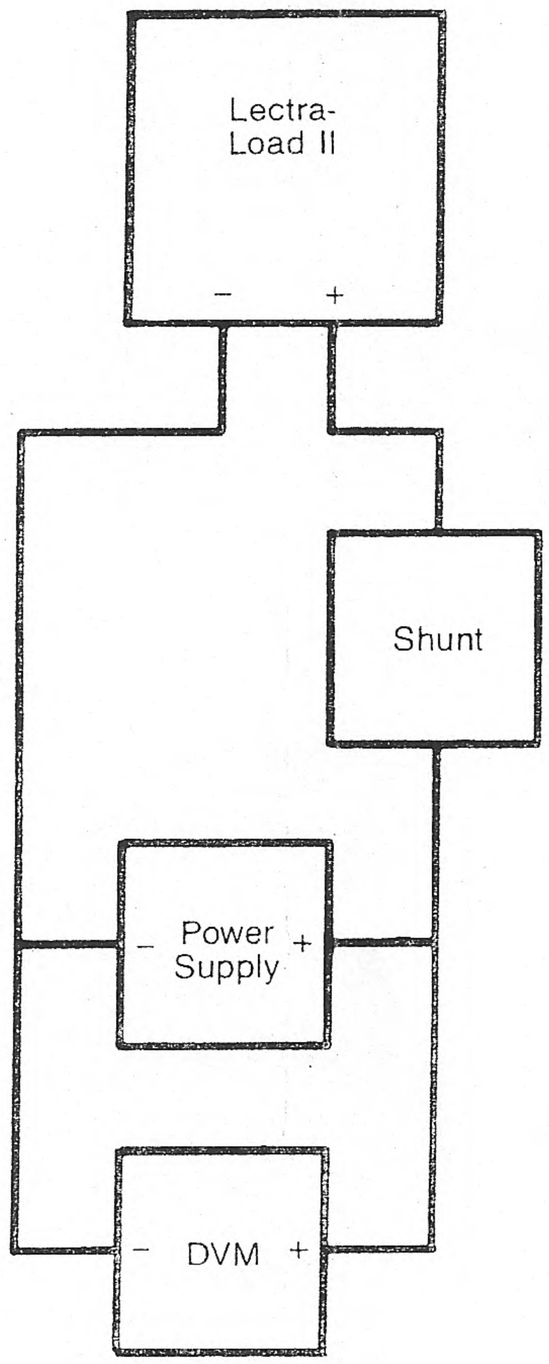
10.3.4.2.6 Connect digital dc voltmeter, set at 200 mV range, in parallel with the power supply, observing polarity (see Figure 6).

10.3.4.3 PROCEDURE

10.3.4.3.1 Connect Lectra-Load II to power source.

10.3.4.3.2 Connect 5 V dc power supply to power source.

Figure 6
Ammeter



10.3.4.3.3 Press the Static Current Pushbutton (19).
a) The pushbutton stays set (down).

10.3.4.3.4 Press the 100 A/V Pushbutton (17).
a) The pushbutton stays set (down).

10.3.4.3.5 Set the Volt/Ampere Selector Switch (2) to the AMPS (right) position.

10.3.4.3.6 Set the ac Line Switch (1) to ON (up).
a) The ac line switch lights.
b) The Amperage LED Indicator (4) lights.
c) The Digital Display (6) lights.

10.3.4.3.7 Turn the Static Current Control (8) until the DVM reads 100 mV.

10.3.4.3.8 Adjust potentiometer R83 until the Digital Display indicates 100 A.

10.3.4.3.9 Press the 0 — 300 A Selector Pushbutton (14).
a) The pushbutton stays set (down).
b) The Digital Display indicates 60 A.

10.3.4.3.9.1 Adjust potentiometer R34 until the Digital Display indicates 60 A.

10.3.4.3.10 Press the 10 A/V Range Selector Pushbutton (16).
a) The pushbutton stays set (down).
b) The Digital Display indicates 10 A.

10.3.4.3.10.1 Adjust potentiometer R30 until the Digital Display indicates 10 A.

10.3.4.3.11 Press the 1 A/V Range Selector Pushbutton (15).
a) The pushbutton stays set (down).
b) The Digital Display indicates between 3 A and 5 A.

10.3.4.3.11.1 Adjust potentiometer R32 until the Digital Display indicates between 3 A and 5 A.

Technical Reference

Parts List

Potentiometer Reference Chart

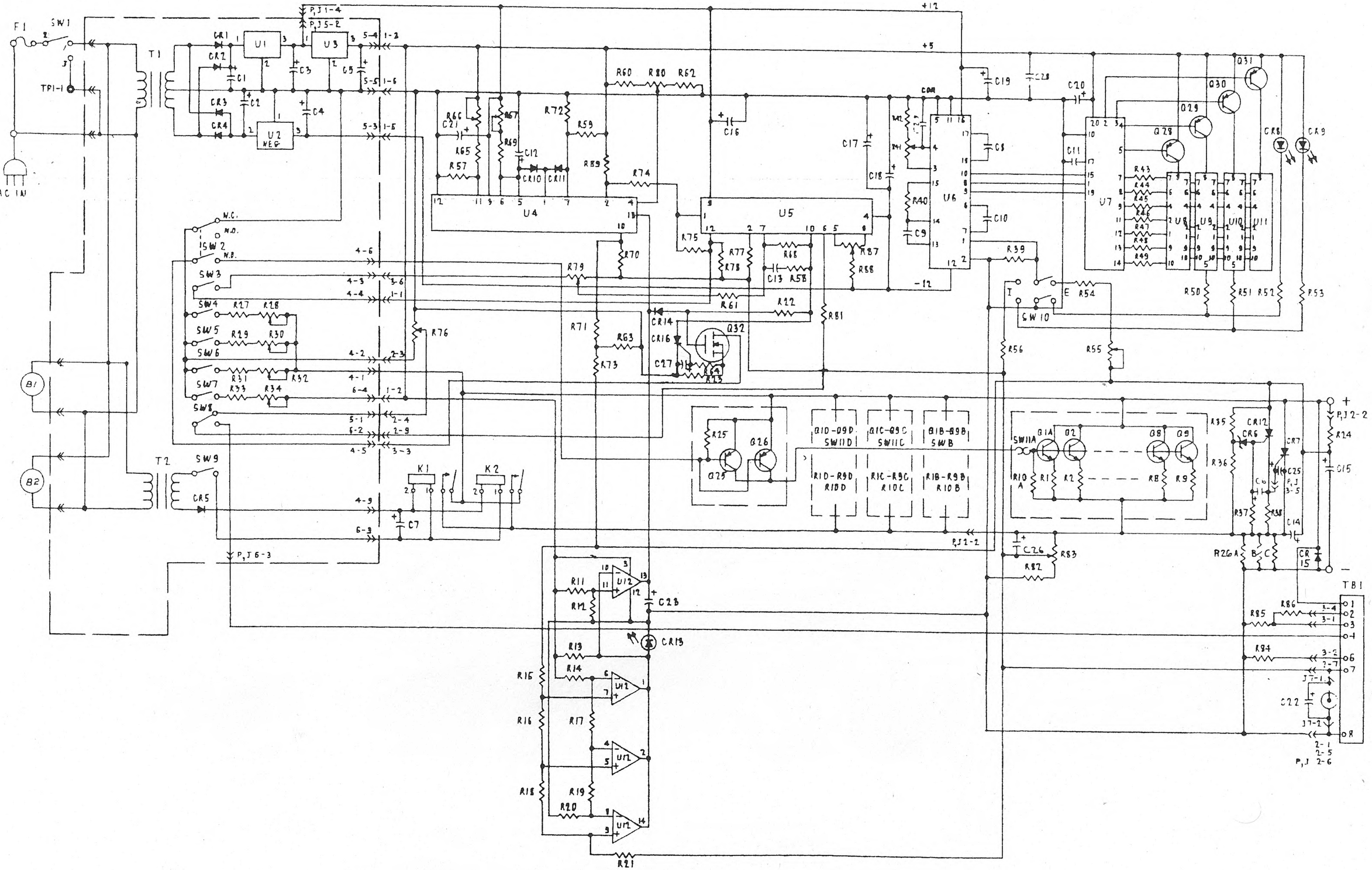
Pot	Function	Value	Location
R28	Ammeter Control	500 Ω	Bottom
R30	10 A/V Calibration	10 kΩ	Bottom
R32	1 A/V Calibration	50 kΩ	Bottom
R34	0 — 300 A Calibration	2 kΩ	Bottom
R41	Ammeter Calibration	500 Ω	Control
R55	Voltmeter Calibration	2 MΩ	Control
R66	OVP Adjustment	10 kΩ	Control
R67	Pulse Repetition Rate Control	5 MΩ	Front
R76	Static Current Control	500 Ω	Front
R79	Pulse Current Control	500 Ω	Front
R80	Pulse Duty Cycle Contol	10 kΩ	Front
R83	Current Calibration	5 MΩ	Control
R87	Nulling Calibration	10 kΩ	Control

Parts List

Schematic Reference	Part Number	Description
R43	2000079	RES CF 68R 1/4W 5P
R44	2000079	RES CF 68R 1/4W 5P
R45	2000079	RES CF 68R 1/4W 5P
R46	2000079	RES CF 68R 1/4W 5P
R47	2000079	RES CF 68R 1/4W 5P
R48	2000079	RES CF 68R 1/4W 5P
R49	2000079	RES CF 68R 1/4W 5P
R23	2010001	RES CF 1R 1/2W 5P
R84	2010006	RES CF 10R 1/2W 5P
R24	2010007	RES CF 100R 1/2W 5P
R37	2010008	RES CF 1K 1/2W 5P
R56	2010008	RES CF 1K 1/2W 5P
R57	2010008	RES CF 1K 1/2W 5P
R58	2010008	RES CF 1K 1/2W 5P
R59	2010008	RES CF 1K 1/2W 5P
R60	2010008	RES CF 1K 1/2W 5P
R61	2010008	RES CF 1K 1/2W 5P
R62	2010008	RES CF 1K 1/2W 5P
R63	2010008	RES CF 1K 1/2W 5P
R64	2010008	RES CF 1K 1/2W 5P
R81	2010008	RES CF 1K 1/2W 5P
R70	2010009	RES CF 10K 1/2W 5P
R71	2010009	RES CF 10K 1/2W 5P
R72	2010009	RES CF 10K 1/2W 5P
R88	2010009	RES CF 10K 1/2W 5P
R89	2010009	RES CF 10K 1/2W 5P
R74	2010010	RES CF 100K 1/2W 5P
R68	2010011	RES CF 1M 1/2W 5P
R65	2010015	RES CF 12K 1/2W 5P
R50	2010018	RES CF 150R 1/2W 5P
R51	2010018	RES CF 150R 1/2W 5P
R52	2010025	RES CF 180R 1/2W 5P
R53	2010025	RES CF 180R 1/2W 5P
R73	2010028	RES CF 180K 1/2W 5P
R82	2010033	RES CF 22R 1/2W 5P
R78	2010036	RES CF 22K 1/2W 5P
R85	2010045	RES CF 300R 1/2W 5P
R38	2010058	RES CF 47R 1/2W 5P
R86	2010060	RES CF 4.7K 1/2W 5P
R36	2010065	RES CF 560R 1/2W 5P
R75	2010074	RES CF 6.8K 1/2W 5P
R77	2010074	RES CF 6.8K 1/2W 5P
R40	2010075	RES CF 68K 1/2W 5P
R69	2010079	RES CF 7.5K 1/2W 5P
R13	2010082	RES CF 820R 1/2W 5P
R17	2040014	RES MF 536R 1/2W 5P
R18	2040019	RES MF 634R 1/2W 1P
R54	2040029	RES MF 9.1M 1/2W 5P
R39	2040030	RES MF 100K 1/2W 1P
R42	2040032	RES MF 1K 1/2W 5P
R12	2040035	RES MF 1.1K 1/2W 1P
R20	2040040	RES 121R 1/2W 1P
R21	2040053	RES MF 150R 1/2W 1P
R15	2040065	RES MF 187K 1/2W 1P
R19	2040069	RES MF 200R 1/2W 1P
R16	2040094	RES MF 3.48K 1/2W 1P
R11	2040098	RES MF 3.92K 1/2W 1P
R14	2040141	RES MF 10K 1/2W 1P
R22	2040141	RES MF 10K 1/2W 1P
R35	2050087	RES WW 4.7K 3W 5P
R80	2070056	POT, 10K
R76	2070060	VERNIER 500R
R79	2070060	VERNIER 500R
R67	2070063	POT 5MEG
R83	2070064	POT, 10R 784
R66	2070065	POT, 10K
R87	2070065	POT, 10K
R55	2070069	POT, 2MEG, 784
R41	2070070	500R, 10T
C28	3010009	CAP, CE, 150MF, 6.3V
C14	3010016	CAP, CE, 47MF, 63V, A
C15	3010016	CAP, CE, 47MF, 63V, A
C11	3040016	CAP, DC, 470PF, 1KV
C13	3040028	CAP, CD, .01MF, 100V
C9	3040039	CAP, CD 1.0MF 50V
C8	3040041	CAP, DC, 2.2MF, .50V
C10	3040041	CAP, CD, 2.2MF, .50V
C17	3040041	CAP, CD, 2.2MF, .50V
C29	3040041	CAP, CD, 2.2MF, .50V
C21	3050005	CAP, CT, 4.7MF, .035V
C6	3050006	CAP, CT, .68MF, .035V
C12	3050006	CAP, CT, .68MF, .035V
C16	3050006	CAP, CT, .68MF, .035V
C18	3050006	CAP, CT, .68MF, .035V
C19	3050006	CAP, CT, .68MF, .035V
C27	3050006	CAP, CT, .68MF, .035V
C20	3050011	CAP, CT, 15MF, 20V
C23	3050011	CAP, CT, 15MF, 20V
C26	3050011	CAP, CT, 15MF, 20V
CR10	4000009	RECT 1N4148 20V 400MA
CR11	4000009	RECT 1N4148 20V 400MA
CR14	4000009	RECT 1N4148 20V 400MA
CR12	4060021	SCR, 100V, 3A, TO-202AB
CR16	4060021	SCR, 100V, 3A, TO-202AB
CR6	4070029	DIODE, ZEN, 1N753A
U4	4080011	LM339N
U12	4080011	LM339N
U6	4080012	IC, TL500CH
U7	4080013	IC, TL502CN
U5	4080014	IC, CA3240EI
Q32	4100004	XTOR, VN10KM
Q28	4100016	2N2907A
Q29	4100016	2N2907A
Q30	4100016	2N2907A
Q31	4100016	2N2907A
U8	4110005	LEO, FND507
U9	4110005	LEO, FND507
U10	4110005	LEO, FND507
U11	4110005	LEO, FND507
CR8	5020004	LIGHT
CR9	5020004	LIGHT
CR13	5020004	LIGHT
SW10	5110011	SW422SDPIPB1
R29	2010061	RES CF 47K 1/2W 5P
R31	2010062	RES CF 470K 1/2W 5P
R33	2010074	RES CF 6.8K 1/2W 5P

Schematic Reference	Part Number	Description
R27	2040105	RES MF 4.53K 1/2W 1P
R30	2070079	POT 10KCTS360
R34	2070080	POT 2KCTS 360T
R28	2070083	POT 500 OHM
R32	2070086	50K, TYPE 360
C3	3000028	CAP, CE, 100MF, 25V, R
C4	3000028	CAP, CE, 100MF, 25V, R
C5	3000036	CAP, CE, 220MF, 16V, R
C1	3000078	CAP, CE, 330MF, 35V, R
C2	3000078	CAP, CE, 330MF, 35V, R
CR1	4000001	RECT 200V 2A AX
CR2	4000001	RECT 200V 2A AX
CR3	4000001	RECT 200V 2A AX
CR4	4000001	RECT 200V 2A AX
CR5	4000001	RECT 200V 2A AX
U3	4080015	IC, UA78M05C
U1	4110003	REG, 78M12
U2	4110004	REG, 79M12
T2	6000194	XFMR ASSY LL-300B
T1	6000444	XFMR LL-300B
R10	2010033	RES CF 22R 1/2W 5P
R1	2050093	RES WW 0.1R 5W 5P
R2	2050093	RES WW 0.1R 5W 5P
R3	2050093	RES WW 0.1R 5W 5P
R4	2050093	RES WW 0.1R 5W 5P
R5	2050093	RES WW 0.1R 5W 5P
R6	2050093	RES WW 0.1R 5W 5P
R7	2050093	RES WW 0.1R 5W 5P
R8	2050093	RES WW 0.1R 5W 5P

Schematic Reference	Part Number	Description
R9	2050093	RES WW 0.1R 5W 5P
Q1	4090012	XSTOR, 68230
Q2	4090012	XSTOR, 68230
Q3	4090012	XSTOR, 68230
Q4	4090012	XSTOR, 68230
Q5	4090012	XSTOR, 68230
Q6	4090012	XSTOR, 68230
Q7	4090012	XSTOR, 68230
Q8	4090012	XSTOR, 68230
Q9	4090012	XSTOR, 68230
SW11	5110002	T-STAT, SW
R25	2000011	RES CF 100R 1/4W 5P
Q25	4090026	2N5883
Q26	4090026	2N5883
C7	3010010	CAP, CE, 220MF, 63V A
C22	3050011	CAP, CT, 15MF, 20V
C25	3050011	CAP, CT, 15MF, 20V
CR15	4000010	RECT., 100V, 70A, DO
CR7	4060001	SCR., 100V, 40A
TB1	5030015	410-Y-B
B1	5080007	MOTOR
B2	5080007	MOTOR
SW1	5110008	SWITCH BPA-CD
K1	5140001	24V STANCOR RELAY FOR LL300B
K2	5140001	24V STANCOR RELAY FOR LL300B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